APPENDIX E - VISUAL SIMULATIONS

VISUAL SIMULATIONS RAY MINE TAILINGS STORAGE FACILITY

ASARCO LLC

Prepared for:

U.S. Army Corps of Engineers

Prepared by:

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On behalf of:

ASARCO LLC- Ray Operations

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1. INTRODUCTION

ASARCO LLC (Asarco) has identified the need for an additional tailings storage facility (TSF) to support ongoing mining operations at the Ray Mine in Pinal County, Arizona. It is anticipated that the construction of an additional tailings impoundment (the Project) would require the discharge of fill to surface drainage features that would be identified as waters of the United States by the U.S. Army Corps of Engineers (Corps).

An analysis of alternatives is required to demonstrate compliance with guidelines established under the Clean Water Act (CWA) Section 404(b)(1) (40 CFR §230) for avoidance and minimization of impacts to jurisdictional waters. Nine alternatives at six potential Project locations are currently being analyzed as part of the Clean Water Act Section 404 (b)(1) Alternatives Analysis prepared for the Project in accordance with the 404(b)(1) guidelines.

Of the six sites considered in the Alternatives Analysis, E Dam, Devils Canyon, West Dam, and Granite Mountain have been deemed impracticable and are not considered further in this investigation. The remaining two sites represent five alternatives, Ripsey Wash (Ripsey Wash Alternatives 1 to 3) and Hackberry Gulch (Hackberry Gulch Alternatives 1 and 2). Ripsey Wash Alternatives 1 and 2 and Hackberry Gulch Alternative 1 were dropped from further consideration because alternatives at these sites were developed that have fewer impacts to waters. Ripsey Wash Alternative 3 and Hackberry Gulch Alternative 2 are currently still being evaluated by Asarco. Asarco has identified Ripsey Wash Alternative 3 as its proposed action in its CWA Section 404 permit application to the Corps.

The Corps has identified visual resources as a topic that will need to be addressed in the Environmental Impact Statement (EIS) to be prepared for the Project in accordance with the requirements of the National Environmental Policy Act. The purpose of this report is to describe the methods used to prepare and present visual simulations of Ripsey Wash Alternative 3 and Hackberry Gulch Alternative 2. The information presented in this report will aid in the evaluation of visual impacts that would result from the construction of either of these alternatives.

2. METHODOLOGY

On December 2, 2013, Susan Corser of ECA Community Planning (ECA), as well as representatives from the Bureau of Land Management, the U.S. Forest Service and WestLand Resources, Inc. (WestLand), met in the field near the town of Kearny, Arizona, to review and discuss possible locations for visual simulations of the Ripsey Wash and Hackberry Gulch alternatives. Based on the findings of that field work and subsequent research performed by ECA, six Key Observation Points (KOP's) were identified (see *Figure E-1*).

On February 5 and March 4, 2014, a representative from WestLand took photos from each of the KOP's and documented the location of each photograph using a Garmin Montana 650t handheld global positioning system (GPS) unit. The camera utilized for taking photographs was a Canon Rebel XT EOS digital camera with a Canon EFS 18–55 mm zoom lens. The lens was set at 33 mm. to compensate for a

crop factor of 1.6, thereby creating an equivalent focal length of 53 mm. (33 mm. lens setting x 1.6 crop factor = 52.8 mm. output view), which creates a frame that mimics the field of view of the human eye. From each KOP, a series of overlapping photographs was taken of the existing landscape that would be affected by the Project.

After downloading the digital images, WestLand "stitched" together the photographs from each photo point using Adobe Photoshop. This "stitching" was done by eye. The width of each panorama was dictated by the size of the visual impact that would result from the construction of the Project. Minor corrections for colors were made in order to correct for small variations between the three photos.

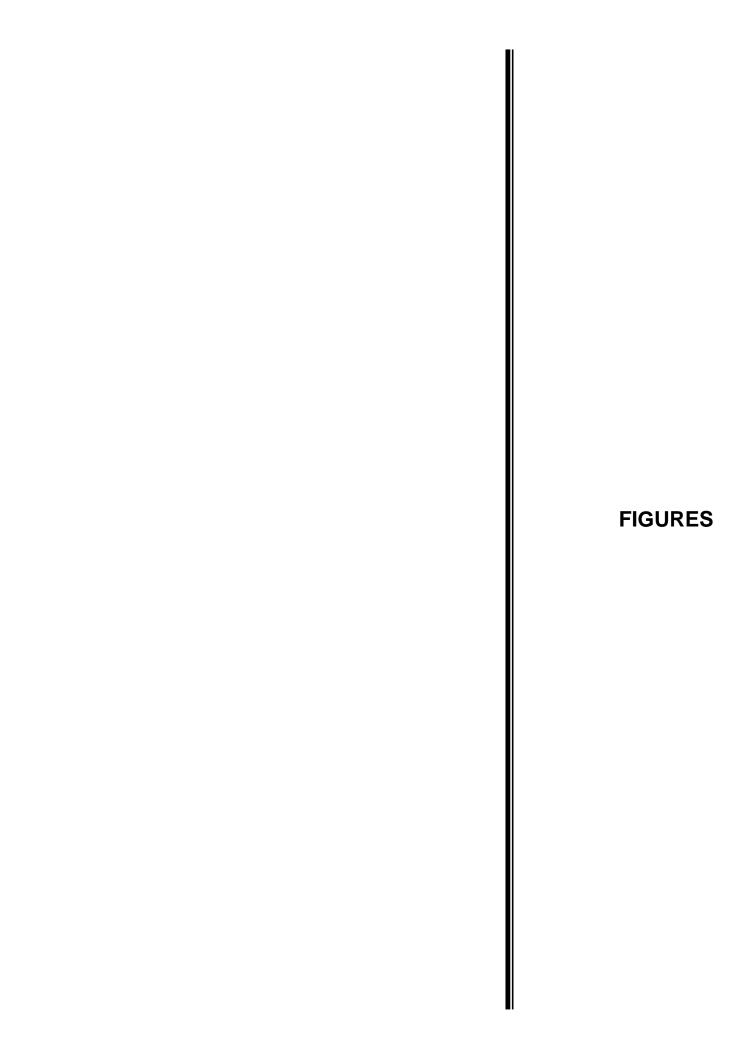
Using ArcGIS 10.1 and 3D Analyst, WestLand merged the publically available USGS Digital Elevation Model (DEM) (10 meter) with three dimensional CAD data of the proposed projects provided by Asarco. The resulting DEM was then imported into AutoDesk InfoWorks (Version 2014) along with the locations of the photo points recorded by the GPS unit. WestLand rotated the DEM to correspond with each photo point location and captured that digital perspective as a DEM image. The horizontal angles of these images varied between 45 to 105 degrees. Depending on the location of the KOP in relation to the Project alternatives, images that incorporated wider angles allowed for more comprehensive simulations of that Project alternative.

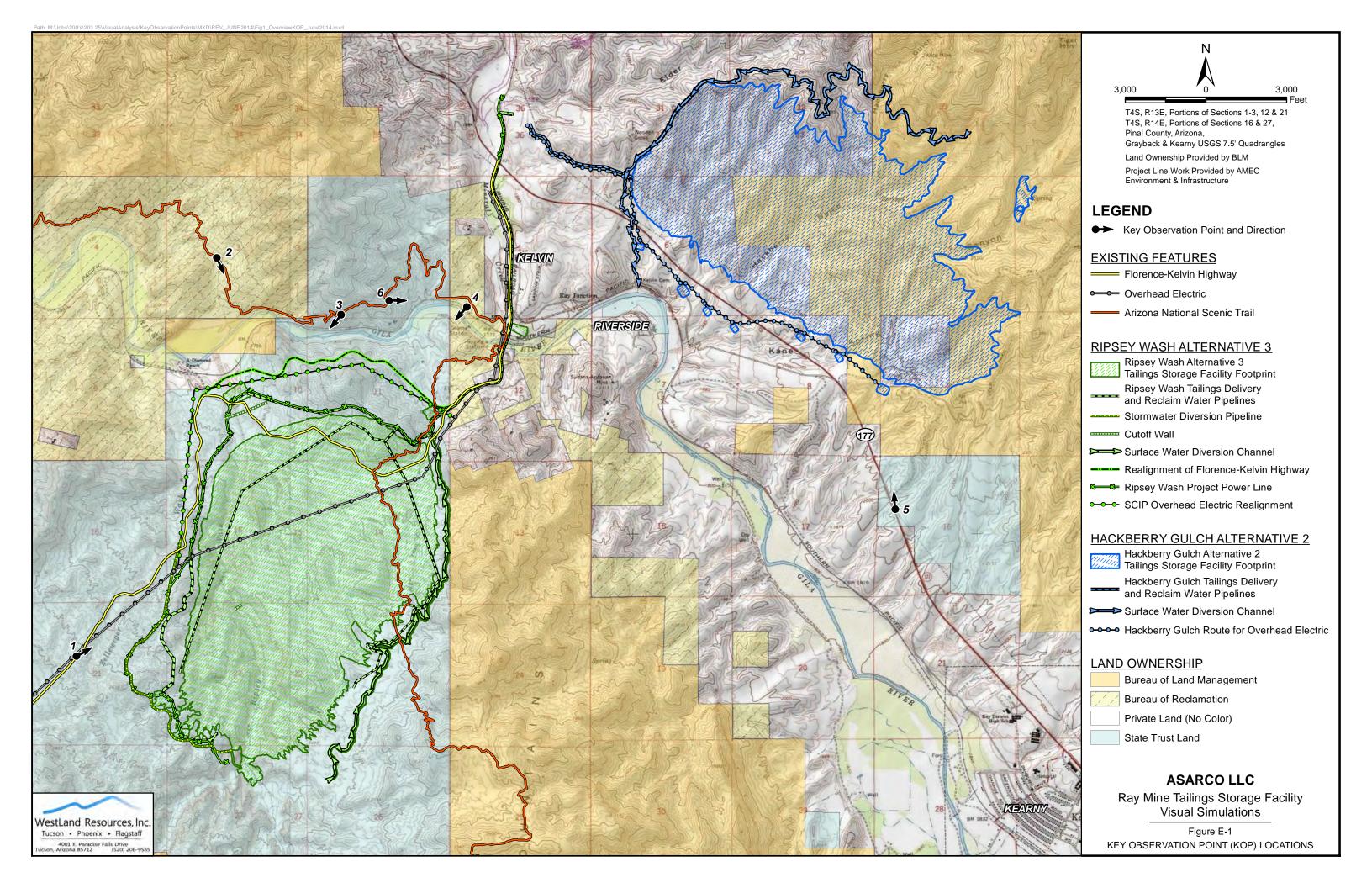
For each photo point, the captured DEM perspective was imported into Photoshop along with the corresponding stitched panoramic image. Using recognizable existing landmarks visible in both, the DEM perspective was aligned with the panorama. The portions of the Project in the DEM image were then isolated and placed over the panoramic image. The DEM image of the Project was then rendered in Photoshop using the colors and textures that are expected to result from the Project.

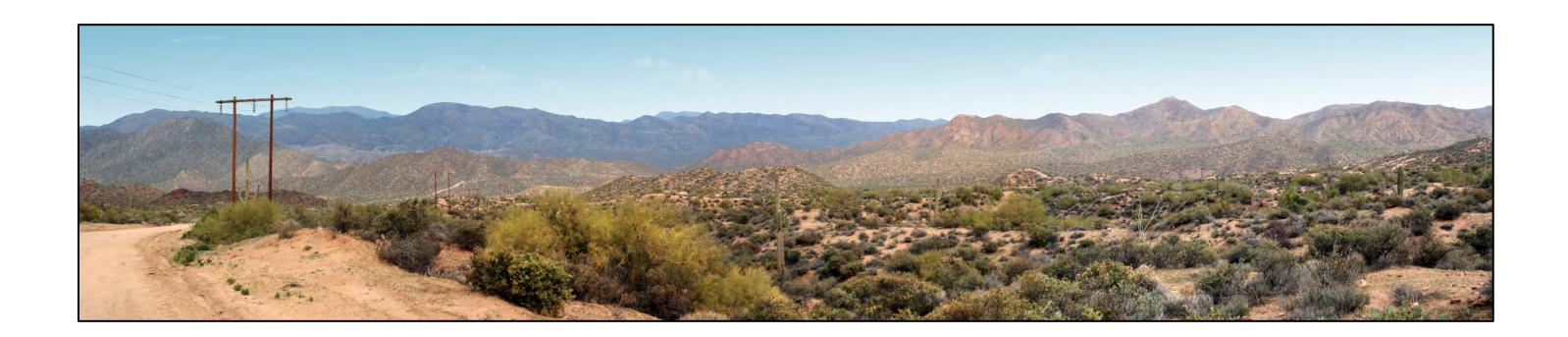
With respect to the printed size of the visual simulations, the simulated image was created with the intention that it be printed on 11" x 17" paper, to be included as a figure in the visual analysis.

3. RESULTS

The images of the existing landscapes associated with each KOP and the rendered simulations for Ripsey Wash Alternative 3 and Hackberry Gulch Alternative 2 are presented as figures following this text.







Time of Photograph: 2:09 PM Latitude: 33.07087

Date of Photograph: 03.04.2014 Longitude: -111.026569

Weather Condition: Mostly sunny Elevation: 2545

Viewing Direction: Northeast Distance: Not applicable

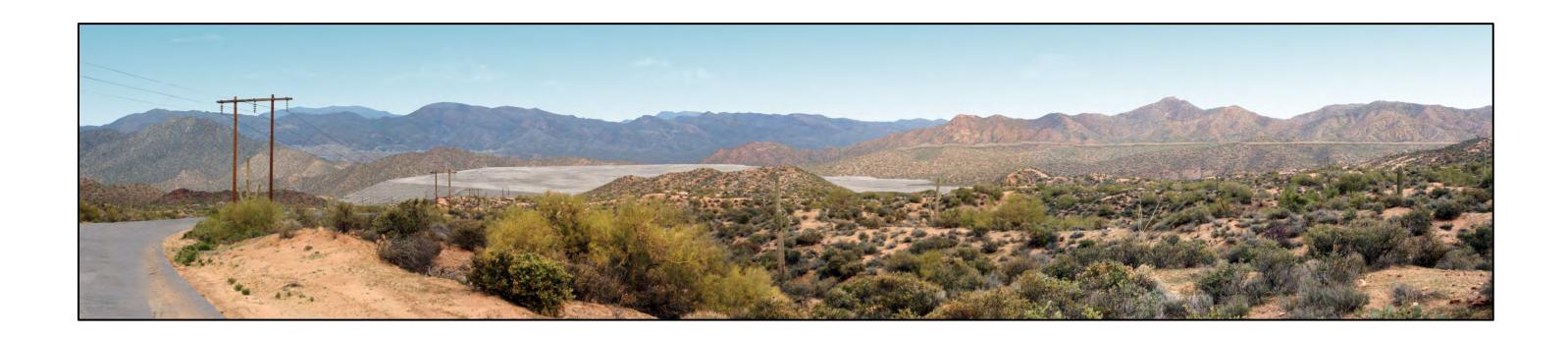
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Ray Mine Tailings Storage Facility

Visual Simulations

Figure E-2: KOP 1 – Florence-Kelvin Highway, Existing Condition





Time of Photograph: 2:09 PM Latitude: 33.07087

Date of Photograph: 03.04.2014 Longitude: -111.026569

Weather Condition: Mostly sunny Elevation: 2545

Viewing Direction: Northeast Distance: 0.76 miles to nearest portion of Ripsey Wash Alternative 3

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Visual Simulations

Figure E-3: KOP 1 – Florence-Kelvin Highway, Ripsey Wash Alternative 3, Completion of Centerline Construction

Note: Simulation indicates impoundment at completion of centerline construction before reclamation with rock surfacing.





Time of Photograph: 2:09 PM Latitude: 33.07087

Date of Photograph: 03.04.2014 Longitude: -111.026569

Weather Condition: Mostly sunny Elevation: 2545

Viewing Direction: Northeast Distance: 0.76 miles to nearest portion of Ripsey Wash Alternative 3

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Visual Simulations

Figure E-4: KOP 1 – Florence-Kelvin Highway, Ripsey Wash Alternative 3, Project Completion

Note: Simulation indicates impoundment at completion of the project before reclamation of the top 30 feet of tailings and surface of the tailings.





Time of Photograph: 3:58 PM Latitude: 33.111533

Date of Photograph: 02.05.2014 Longitude: -111.009503

Weather Condition: Lightly overcast Elevation: 1897

Viewing Direction: South to southeast Distance: Not applicable

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Visual Simulations

Figure E-5: KOP 2 – Arizona Trail, Mile 4.3, Existing Condition





Time of Photograph: 3:58 PM Latitude: 33.111533

Date of Photograph: 02.05.2014 Longitude: -111.009503

Weather Condition: Lightly overcast Elevation: 1897

Viewing Direction: South to southeast Distance: 1.28 miles to nearest portion of Ripsey Wash Alternative 3

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Visual Simulations

Figure E-6: KOP 2 – Arizona Trail, Mile 4.3, Ripsey Wash Alternative 3, Completion of Centerline Construction

Note: Simulation indicates tailings impoundment at completion of centerline construction before reclamation with rock surfacing.





Time of Photograph: 3:58 PM Latitude: 33.111533

Date of Photograph: 02.05.2014 Longitude: -111.009503

Weather Condition: Lightly overcast Elevation: 1897

Viewing Direction: South to southeast Distance: 1.28 miles to nearest portion of Ripsey Wash Alternative 3

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Visual Simulations

Figure E-7: KOP 2 – Arizona Trail, Mile 4.3, Ripsey Wash Alternative 3, Project Completion

Note: Simulation indicates tailings impoundment at completion of the project before reclamation of the top 30 feet of tailings.





Time of Photograph: 1:57 PM Latitude: 33.1057 Date of Photograph: 02.05.2014 -110.994414

Longitude:

Lightly overcast Weather Condition: Elevation: 2128

Viewing Direction: Not applicable South to southwest Distance:

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Visual Simulations

Figure E-8: KOP 3 – Arizona Trail, Jake's Overlook, Existing Condition





Time of Photograph: 1:57 PM Latitude: 33.1057

Date of Photograph: 02.05.2014 Longitude: -110.994414

Weather Condition: Lightly overcast Elevation: 2128

Viewing Direction: South to southwest Distance: 0.27 miles to nearest feature of relocated highway

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Visual Simulations

Figure E-9: KOP 3 – Arizona Trail, Jake's Overlook, Relocated Florence-Kelvin Highway (uncolored retaining walls) & SCIP Transmission Line





Time of Photograph: 1:57 PM Latitude: 33.1057

Date of Photograph: 02.05.2014 Longitude: -110.994414

Weather Condition: Lightly overcast Elevation: 2128

Viewing Direction: South to southwest Distance: 0.27 miles to nearest feature

0.27 miles to nearest feature of relocated highway

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Visual Simulations

Figure E-10: KOP 3 – Arizona Trail, Jake's Overlook, Relocated Florence-Kelvin Highway (colored retaining walls) & SCIP Transmission Line Note: Simulation is intended to demonstrate the effectiveness of the use of colored concrete as a proposed mitigation measure.





Time of Photograph: 11:55 AM Latitude: 33.106491

Date of Photograph: 02.05.2014 Longitude: -110.979205

Weather Condition: Lightly overcast Elevation: 1795

Viewing Direction: Southwest Distance: Not applicable

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Visual Simulations

Figure E-11: KOP 4 – Arizona Trail Access, Existing Condition





Time of Photograph: 11:55 AM Latitude: 33.106491

Date of Photograph: 02.05.2014 Longitude: -110.979205

Weather Condition: Lightly overcast Elevation: 1795

Viewing Direction: Southwest Distance: 0.71 miles to nearest visible section of

relocated highway

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Visual Simulations

Figure E-12: KOP 4 – Arizona Trial Access, Relocated Florence-Kelvin Highway (uncolored retaining walls) & SCIP Transmission Line





Time of Photograph: 11:55 AM Latitude: 33.106491

Date of Photograph: 02.05.2014 Longitude: -110.979205

Weather Condition: Lightly overcast Elevation: 1795

Viewing Direction: Southwest Distance: 0.71 miles to nearest visible section of

relocated highway

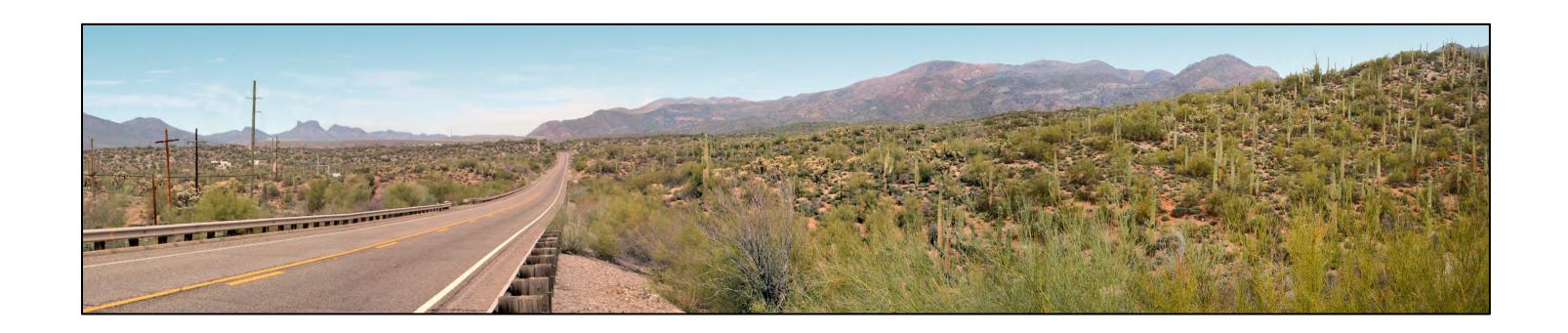
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Visual Simulations

Figure E-13: KOP 4 – Arizona Trail Access, Relocated Florence-Kelvin Highway (colored retaining walls) & SCIP Transmission Line Note: Simulation is intended to demonstrate the effectiveness of the use of colored concrete as a proposed mitigation measure.





Time of Photograph:12.01 PMLatitude:33.085821Date of Photograph:03.04.2014Longitude:-110.92717Weather Condition:Lightly overcastElevation:2030

Viewing Direction: North Distance: Not applicable

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Visual Simulations

Figure E-14: KOP 5 – State Route 177, Existing Condition





Time of Photograph: 33.085821 12.01 PM Latitude: Date of Photograph: 03.04.2014 Longitude: -110.92717

Weather Condition: Lightly overcast Elevation: 2030

Viewing Direction: North Distance:

0.85 miles to nearest portion of Hackberry Gulch Alternative 2

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Visual Simulations

Figure E-15: KOP 5 – State Route 177, Hackberry Gulch Alternative 2, **Project Completion**

Note: Simulation indicates tailings impoundment at completion of the project before reclamation of the top 30 feet of the tailings.





Time of Photograph: 1:21 PM Latitude: 33.107156

Date of Photograph: 02.05.2014 Longitude: -110.988557

Weather Condition: Lightly overcast Elevation: 2037

Viewing Direction: East Distance: Not applicable

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Visual Simulations

Figure E-16: KOP 6 – Arizona Trail, Mile 2, Existing Condition





Time of Photograph: 1:21 PM Latitude: 33.107156 Date of Photograph: Longitude: 02.05.2014 -110.988557

Lightly overcast Weather Condition: Elevation: 2037

1.87 miles to nearest portion of Hackberry Gulch Alternative 2 Viewing Direction: Distance: East

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Visual Simulations

Figure E-17: KOP 6 - Arizona Trail, Mile 2, Hackberry Gulch Alternative 2, **Project Completion**

Note: Simulation indicates tailings impoundment at completion of the project before reclamation of the top 30 feet of the tailings.

